Electrical Requirements for BLADEM

Electrical requirements depend on the total number of modules in the display and the breaker rating. This formula below will help you determine the maximum amperage...

\[
\frac{\text{# of LED Panels} \times \text{Watts per Panel} + \text{Controller Watts}}{\text{VAC}} = \text{Maximum Amperage}
\]

Cheat Sheet assuming display is connected to a 20amp breaker...

- 16 panels max on 110v • 18 panels max on 120v
- 32 panels max on 220v • 36 panels max on 240v

Anything larger will need more than one line of power*

*Adding an additional line of power will require a power injector which would have been provided. Please see page #7 for power injector setup.

Remember, an electrician will recommend that your maximum amperage does not exceed 80% of the breaker’s capacity. Also, it is required that a single circuit should not exceed 20 amps for proper operation. **No more than 20 amps should pass through any single cable or controller.**

**IMPORTANT** - the BladeM warranty requires that the display is on its own direct circuit.

Internet Connection Requirements for BLADEM

Every BladeM display comes with 3 options for connecting to the internet. #1 Cellular, which is included at no extra cost for 5 years (unless opted out at the time of order). #2 WiFi, with our TP-Link connection kit and #3 hardwiring directly into the M1 controller with Cat5, Cat6 or Fiber. Fiber must be converted back to Ethernet before it is plugged into the controller. We don't support a direct fiber link.

Cellular is provided by T-Mobile, so please check the coverage map to determine if the reception will be sufficient at the location. [https://www.t-mobile.com/coverage/coverage-map](https://www.t-mobile.com/coverage/coverage-map). The map is not always reliable for site specific coverage, so it's always important to have a backup plan with the WiFi EnGenius kit or hardwire options.

To map the display and for the controller to receive and push content from ScreenHub, it MUST be connected to a STABLE internet source.

**M1 Controller Diagram**

1. Cellular Antenna
2. WiFi Antenna
3. Hardwire / LAN
4. Data Port B (screen side 2)
5. Data Port A (screen side 1)
6. Power Input
7. Indicator Button
8. Power Switch
Installation Requirements for BLADEM

With our modular design, installation is simple and straightforward. It is often helpful to do a dry run in the shop, assembling the frames, inserting the modules and powering up the sign before taking out to site. Our displays come with two different frame types... 2x4’ and 1x2’ as shown below.

On the front side of the frame, please make sure you place the frames with the arrow up for assembly.

2x4’ empty frame.

1x2’ frame with LED mod inserted.

The frames are pre-tapped for 3mm hex bolts, which also come with the display. The pre-tapped framing system.

IMPORTANT- You must screw in every bolt to the 4 locations on each frame face where another frame connects. Failure to do so can create panel gap, as well as rigidity issues.

You can also manipulate our frames in any fashion... screw, weld, bolt or other methods to simplify your installation for any type of setup. Pole, pylon, monument, wall mount or retrofit, our framing system makes any type of install super simple. The frames also come with pre-drilled holes to mount angle iron vertically or horizontally.

Notes on using the TP-Link WiFi Kit...
The TP-Link unit must be placed on the building with a connection DIRECTLY INTO THE ROUTER at the business. The TP-Link broadcast unit must have a DIRECT LINE OF SIGHT TO THE SIGN NO MORE THAN 300-350 FEET AWAY. If the distance is greater than that, a receiving TP-Link unit must be purchased and installed at the sign to increase the distance. An electrical outlet to plug in the TP-Link must be within 30 feet to provide power to the unit.

When using the TP-Link with a business that would have protected network channels/firewalls using Static IP’s... which are common for banks, schools and government entities, the TP-Link would have to be configured correctly to work with their network requirements. It is good practice to have the business and their network person connect with Cirrus tech support as quickly as possible before we ship the display so we can apply the proper configuration to the TP-Link unit which will make the install process on site much smoother.
Wiring the Display
It is best practice to wire controller FIRST into the display vs last. Wiring the controller last could cause the entire display to be wired incorrectly. The controller can be wired starting in any corner, but most commonly placed near the bottom left or right corner.

You can wire in any direction... up/down or left/right, as long as it's in a continuous chain.

Per the diagram above, the first cable from Port A on the controller would then be placed into the right port on the mod. If the controller was to start in the bottom left, then the cable from the controller to the first mod would also be placed in the right port.

This video will walk you through the unboxing, frame assembly and module installation process. 
https://youtu.be/4zMc0IM--p4
Extension Cable
The display also comes with a 10 foot extension cable which makes placing the controller further away from the first mod a little easier... or to connect the 2nd face of the display to the controller. Please note that the extension cable does not directly plug into the first mod. Please place the 2 foot cable first into the right port of the mod, then connect the extension.

Cellular and WiFi Extensions
The M1 Controller comes with Cellular and WiFi extensions. When the controller is mounted inside of an enclosure, you must place the antennas outside of the enclosure with these items below.
Module Indicator Light
Every LED module has an indicator light on the back to help you discern what is the current status.

- **Flashing RED** means it's receiving power but no data.
- **Flashing GREEN** means it's receiving power and data.
- **Flashing WHITE** means it's receiving a firmware upgrade.
- **Flashing BLUE** means it's receiving module mapping.

In the example above, the larger cellular antennas are mounted on the outside of the enclosed LED display. You can mount one or both, in the same location or opposite sides. They can be placed where you perceive that you can receive the best cellular signal.

The controller is waterproof and can be mounted on the outside of the display as well.

If you have power tied in but there are no indicator lights blinking on any of the mods, please check the controller power connection and make sure the rocker switch is turned on. If you have a lone module not blinking at all, please check the cable connection.
First Time Powering The Display On
When you initially turn on the display with the electrical connected, please press the M1 Controller rocker switch to on...

When the display turns on, you’ll see Cirrus logos on each module. If for some reason one of the panels does not have a Cirrus logo, the module is likely fine as long as the indicator light on the back is blinking green. Once the display is mapped, the panel will function normally

THIS MODULE IS FINE, as long as the indicator light on the back is blinking green.
Power Injector

As described above, the power injector adds another line of power when necessary due to the electrical requirements of the display. The injector can be mounted anywhere on the framing structure as long as it can continue the LTW cable daisy chain from mod to mod.

Power injector positioning is dependent on amperage specifications and electrical load. We can use the cheat sheet below to provide a few examples...

Cheat Sheet assuming display is connected to a 20amp breaker...

<table>
<thead>
<tr>
<th>Panels</th>
<th>Power Injector Positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 max on 110v</td>
<td>Power injector positioned every 16 panels</td>
</tr>
<tr>
<td>18 max on 120v</td>
<td>Power injector positioned every 18 panels</td>
</tr>
<tr>
<td>32 max on 220v</td>
<td>Power injector positioned every 32 panels</td>
</tr>
<tr>
<td>36 max on 240v</td>
<td>Power injector positioned every 36 panels</td>
</tr>
</tbody>
</table>

It would be unlikely to add an additional injector/line of power for display in the range of 16-32 panels on a 110v or 120v line as it’s very simple to upgrade those lines to a 220v or 240v. Simply make the neutral wire hot and add a double pole circuit breaker which is only a $10-$20 upgrade. **Please consult a licensed electrician for details.**
Our cables and ports are rated to receive a maximum of 20 amps. If the breaker you plan to use is higher than 20, then you would need a simple sub-panel at the sign to step it down to 20. In the example below, the breaker is rated at 40 amps with 208V service. Here is how it would work...

In the example on the following page, we will demonstrate how to add power boosters to a 10x14 double sided display. The breaker is rated at 20 amps, 240V and we would need 4 lines to properly power both sides.

36 panels max on 240v - Power injector positioned every 36 panels

On the page above, the cheat sheet determines that on 240V, 20 amp service, you would need a booster every 36 modules. In the example below, you see the display on each side is broken up into two sections. One green section with the first 36 modules on Side A, being powered from the controller and then the remaining 24 modules getting power from the first booster.

On Side B, a booster is pushing power into the first 36 modules and then the 2nd booster provides the power for the remaining 34. Note, that the booster also acts a pass through for the data. This 10x14 double sided display would need 4 lines of 240V, being fed into 1 controller and 3 power boosters.
Cable from port A on the controller passing power and data to the first 36 modules

Cable from power booster pushing power and data into the first 36 modules on side B.

Display Side A

20 Amp Circuit Breaker at building

Cable continuing daisy chain of power

Display Side B

Line pushing power into 2nd booster on side A

Line pushing power into the controller

Line pushing power into 2nd booster on side B

Line pushing power into the 1st booster on side B

Cable from port A on the controller passing power and data to the first 36 modules

Cable pushing power and data to the remaining 34 Modules

Cable continuing daisy chain of power

Cable pushing power and data to the remaining 34 Modules
Ventilation
The BladeM LED’s are an advanced solid state module with no moving parts, internal wires or fans. The modules ventilate through the front LED’s as well the industrial grade heatsink on the back. It is recommended that you provide a way for the heatsink and controller to be passively cooled.

If you plan on leaving the backs completely open which is completely fine to do, you’ll obviously have plenty of airflow across the back of the heatsinks. Every module is rated to IP67, so no need to enclose the display.

As you can see in this example below, this 3x8 display is not skinned or enclosed in any way. The frames and mods are completely left open to the elements which is not a problem with our technology.

In this example, the display and controller is enclosed with a simple aluminum skin. The shop added 2 vents per side which is recommended for passive airflow to reach the modules and controller.
Another option is to leave the top open where it is not visible which would provide adequate ventilation.

**Open Top**

If needing to skin the display, we would suggest the option of using affordable perforated aluminum or steel. It would provide the best airflow while adding really nice aesthetically. In the example below, you can see the skin on the slides is perforated to allow airflow.
Below is a checklist of the key requirements that will make your install a breeze.

**Electrical**

1. What is the average continuous power? □ 2. What is the breaker rating? □
   See quote for this info

3. What is the VAC? (110, 120, 208, 220, 240) □ 4. How many total LED modules? □

5. Have you completed the formula to determine maximum amperage found on page one and if so what is the total? □

6. Is maximum amperage under the 80% threshold required by law? □

7. Does the quote call for a power injector? □
   If so, have you made a diagram to place where the power injectors will be located with the additional lines of power? □
   If necessary, contact tech support for assistance with power injector placement. 877-636-2331 Option 2

**Based on the seven questions above, do you have the proper electrical setup?** □

**Internet**

1. How are you connecting to the internet? Cellular □ WiFi with TP-Link □ Hardwire □
   If with Cellular, have you checked the T-Mobile coverage map? □
   Are the cellular antennas installed correctly and placed outside of any enclosure so it can receive a signal? □

2. If with the WiFi (TP-Link), are you 300-350 feet or less, with a direct line of sight from the building to the controller? □
   If longer than 300-350 feet, did you purchase a receiving unit to be placed with the controller? □
   Are the WiFi antennas installed correctly and placed outside of any enclosure so it can receive a signal, with a direct line of sight to the sending TP-Link unit? □
   If Hardwired (Cat 5, Cat 6 or Fiber - requires adapter) have you checked that the hardwire has an active internet connection? □
3. If you are planning to use either the WiFi (TP-Link) or hardwire, have you asked the business if their WiFi has any static IP/firewall requirements?

If they do, have you connected the network/IT person at the business with Cirrus tech support to configure the EnGenius or controller?

4. Do you have a backup plan if the cellular connection is weak or non-existent, even if the T-Mobile map claims to have good coverage?

Based on the questions above, do you have the proper internet setup?

Installation

Every installation is different which often requires a unique set of variables for the type of install... pole, pylon, monument, retrofit, etc. You are the expert so we will leave that to you, but from the Cirrus display perspective, here are the key elements to be aware of.

1. Are the arrows on the frames in the up position?

2. Have you screwed in all of the hex bolts into the aluminum frames?

3. If the display is 4x8 or larger, do you have bracing every 4 vertical feet?

4. Do you plan to start cabling from the controller first then to the rest of the mods following the diagram above on page 3?

5. When gently pushing in the cables to the ports, did you hear the audible click to make sure the connection is secure?

6. Does the display have adequate ventilation? If enclosed, do you have several vents to let airflow reach the back of the display for the heat sinks?

Based on the questions above, do you have the proper setup for installation?

This info above covers the key components for a simple and successful install. If you have questions, our tech support team is always available to provide further assistance.

support@cirrusled.com • (877) 636-2331 Option 2